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PATENT COOPERATION TREATY

PCT/FR2003/003867



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BIF023241/BQ	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FR2003/003867	International filing date (day/month/year) 22 décembre 2003 (22.12.2003)	Priority date (day/month/year) 24 décembre 2002 (24.12.2002)
International Patent Classification (IPC) or national classification and IPC H01L 21/18, 21/762		
Applicant COMMISSARIAT A L'ENERGIE ATOMIQUE		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 04 juin 2004 (04.06.2004)	Date of completion of this report 21 March 2005 (21.03.2005)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

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I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

- ☐ the international application as originally filed.
- ☒ the description, pages 1-22, as originally filed,
pages _____, filed with the demand,
pages _____, filed with the letter of _____,
pages _____, filed with the letter of _____.
- ☒ the claims, Nos. 1-38, as originally filed,
Nos. _____, as amended under Article 19,
Nos. _____, filed with the demand,
Nos. _____, filed with the letter of _____,
Nos. _____, filed with the letter of _____.
- ☒ the drawings, sheets/fig 1/6-6/6, as originally filed,
sheets/fig _____, filed with the demand,
sheets/fig _____, filed with the letter of _____,
sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-38	YES
	Claims		NO
Inventive step (IS)	Claims	1-38	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-38	YES
	Claims		NO

2. Citations and explanations

1. Reference is made to the following documents:

D1: US-A-5 138 422 (KUROYANAGI SUSUMU ET AL)
11 August 1992;

D2: US-A-6 013 954 (HAMAJIMA TOMOHIRO)
11 January 2000;

D3: US-A-5 661 316 (VANDERWATER DAVID A ET AL)
26 August 1997;

D5: EP-A-0 889 509 (HARRIS CORP) 7 January 1999.

2. The present application fulfils the requirements set forth in PCT Article 33(1) because the subject matter of claims 1 and 32 is novel (PCT Article 33(2)) and involves an inventive step as defined in PCT Article 33(3).

2.1 Document D1, which is considered to be the prior art closest to the subject matter of claims 1 and 32, describes (the references between parentheses apply to said document):

- two substrates consisting of crystalline portions (D1, figure 1(e), reference signs 1 and 4) and comprising an interface produced by molecularly bonding the two surfaces and heat-treating the bond in order to consolidate same (D1: column 6, lines 32-43);
- a step of forming, in at least one of said two surfaces, localised areas on which a material other than those which constitute said crystalline portions is stacked (D1, figure 1(e), reference sign 3b); and
- a step of producing impurity traps so that any interface portion spaced apart from the stacked areas is no more than a predetermined distance away from a stacked area or a trap (D1: figure 1(f), reference signs 3b and 6; column 7, lines 57-62; column 8, lines 32-34).

2.2 It follows that the subject matter of claims 1 and 32 differs from this known method and structure in that:

- said two substrates comprise crystalline portions having, on either side of said interface, a rotational misalignment deviation of less than $\pm 6^\circ$ and a flexural misalignment deviation of less than $\pm 1^\circ$; and
- the surfaces are positioned opposite one another in such a way that the misalignment deviation between the crystalline portions of said two substrates is below a predetermined threshold.

2.3 It follows that the subject matter of claims 1 and 32 is novel (PCT Article 33(2)).

2.4 The problem that the present invention is intended to solve can therefore be considered to be that of **producing impurity traps with reduced misalignment.**

2.5 The solution to this problem, as proposed in claims 1 and 32 of the present application, is considered to involve an inventive step, for the following reasons:

2.6 None of the documents cited in the international search report suggests the solution in claims 1 and 32:

- Even though **document D5 describes impurity traps**, the method known therefrom leads to a misalignment of the two substrates. Claims 1 and 32, on the other hand, describe a misalignment that is below a predetermined threshold.
- Even though **documents D2 and D3 describe the precise alignment of the two substrates** (D2: column 4, lines 33-38; D3: figures 2 and 3; column 4, lines 34-65; column 5, lines 25-46), documents D2 and D3 do not describe the production of impurity traps with reduced misalignment.

2.7 It would not be obvious for a person skilled in the art to use the features known from documents D2, D3 or D5, with a corresponding effect, in a method and construction as per document D1 and thereby arrive at a method and construction as per claims 1 and 32.

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- 2.8 In particular, it would not be obvious for a person skilled in the art to create stacked areas consisting of a material other than that used in the crystalline areas in order not only to produce impurity traps but also to generate a misalignment deviation below a predetermined threshold.
- 2.9 The subject matter of claims 1 and 32, therefore, involves an inventive step as defined in PCT Article 33(3).
3. Claims 2-31 are dependent on claim 1 and claims 33-38 are dependent on claim 32. It follows that, as such, claims 2-31 and 33-38 also fulfil the PCT requirements of novelty and inventive step.
4. The subject matter of claims 1-38 fulfils the requirements set forth in PCT Article 33(4).